

The last chapter contains a warm defence of the utility of symbolic logic, though the author does not claim that it can be used directly by natural science.

(3) Mr. Joseph's work is on very different lines from the two foregoing. It is an excellent and very sound exposition of the traditional logic for which Oxford has been famous ever since the days of Chaucer's Clerk. But if the matter is traditional, the manner of exposition is as fresh and independent as it could well be, and the author has entirely fulfilled the desire expressed in his preface not to teach anything to beginners which they should afterwards have merely to unlearn. Especially valuable are some of the discussions of particular topics, *e.g.* of the *principium individuationis* (on p. 76), or (on p. 275) of the passage from Aristotle's "Categories" which is sometimes quoted as a source of the "Dictum De Omni." We note, too, Mr. Joseph's irresistible objections to classificatory division by dichotomy, so zealously defended by Jevons and the others who won our earliest logical sympathies, and his rejection (in excellent company) of the doctrine of the inverse relation of extension and intension.

Mr. Joseph has interesting remarks to make on the relation between mathematics and logic, and a good statement of the doctrine that the principle of syllogistic inference cannot be made into the premiss of a particular syllogism without begging the question. His chapter entitled "The Presuppositions of Inductive Reasoning: the Law of Causation," is a model of clear and forcible reasoning. Mill's four methods, he finds, may be reduced to one "method of experimental inquiry," which is ultimately based on disjunctive reasoning, and the essence of which is "that you establish a particular hypothesis about the cause of a phenomenon, by showing that, consistently with the nature of the relation of cause and effect, the facts do not permit you to regard it as the effect of anything else."

There is a valuable seven-page discussion (pp. 352-8) of the inductive syllogism in Aristotle, whom the author seeks to defend—not without qualifications—from the objection that, after all, his induction rests on complete enumeration, and that thus *deduction* from any premiss so gained becomes a hollow pretence. Where the units are species, he points out, and one wants to prove something about the genus to which they belong, complete enumeration is possible and legitimate: but where the units are individuals, one does not (according to Aristotle) work by an inductive syllogism that summons all the instances; one learns the essential nature of the species to which they belong by induction, but the induction is now a psychological rather than a logical process, and we arrive at the conclusion, not through an inductive syllogism, but "in virtue of the necessary relation between the two terms which our familiarity with particulars makes possible, but which is the work of intellect or *nous*." We should have welcomed in this connection a detailed exposition of some of the difficulties in the concluding chapter of the *Posterior Analytics*.

(4) This volume is the first instalment of what

promises to be an important inquiry, "inductive, psychological, genetic," into the actual movement of the function of knowledge. The author distinguishes genetic logic from formal (or the logician's) logic, and metaphysical logic (or logicism), and he describes genetic logic as the physiology and comparative morphology of knowledge—physiology because it examines function, and comparative morphology because "it asks about the relation of the forms and other logical determinations of the several modes of cognitive process to one another, and aims to make out an interpretation of the series of forms as conditioned upon functions."

Prof. Baldwin's account of the process by which cognition is built up is so coherent and intricate that it is impossible to give more than a fraction of its substance here. He begins with the condition of bare awareness of an object, the a-dualistic consciousness, examines the place of interest as a factor in the determination of the object, and the meaning of various terms like *disposition*, *autonomic*, *heteronomic*, *control*, *project*, *reality coefficient*; shows how "it is the stimulation, not the response, that is the controlling factor in the construction of sense objects," and how the first distinction is made in the perception of persons and things. Then he passes to image objects and memory objects, and discusses the process by which the inner-outer dualism is reached. This leads him to an examination of play or make-believe objects, and then we have three valuable chapters on various aspects of meaning. The last two chapters deal with the mind-body dualism and the dualism of subject and object.

The terminology of the work is not of the simplest, but behind it one finds that the writer has something true and important to say. Two other volumes—one on experimental logic and one on real logic—will complete the work, which is being published simultaneously in English and French.

A MANUAL OF PHARMACOLOGY.

A Manual of Pharmacology. By Dr. W. E. Dixon. Pp. xii+451; numerous curves, diagrams, and formulæ in the text. (London: Edward Arnold, 1906.) Price 15s. net.

PHARMACOLOGICAL literature in the English language has during the last few years increased considerably, and this is true even if we exclude the copious additions to this literature emanating from America. Students of pharmacology at the present time have at least three exhaustive text-books to choose from, all up to date, and written by teachers actively engaged both in teaching and original research. In each of these works the classification of the subject adopted is markedly different, from which, perhaps, the philosophical reader would be apt to infer that in the present state of our knowledge, whether of the action of drugs or of the chemical composition of their active ingredients, no absolute classification is possible. In the book before us prominence is certainly given in determining classification to the physiological action of the drugs in question, and in the present

state of our knowledge perhaps a classification based upon such principles is the most satisfactory. The matter is, however, one of considerable difficulty, as nearly all drugs exert many physiological actions not always differing only in degree, but in some cases actually in kind. It is, from the nature of the case, therefore obligatory to take one action of a drug as determining its position in one or other group. As an instance we may cite caffeine. Dr. Dixon places this drug by virtue of its action in the group of diuretics; if we, however, follow the text we find that considerable space is of necessity devoted to the other, almost equally important, actions of this alkaloid.

It is difficult in a review of ordinary dimensions to do adequate justice to a work of this character, and in the remarks which follow we shall confine ourselves to a few salient points which strike us as being likely to interest the medical and general scientific reader. In the first place, it seems that on account of the entire absence of all reference to original literature the book is not intended to be a book of reference; further, the absence of information with regard to pharmacological technique obviously places the book in the library rather than in the laboratory. As the author states clearly in his preface, several of the facts are new, and doubtful statements have been verified by experiments performed in his own laboratory. In this connection we must say at once that the reader will have carefully to consider the magnitude of the evidence with regard to these new facts and verifications of doubtful ones. The therapeutics included in Dr. Dixon's work are only such as to illustrate the pharmacology; from this it clearly follows that the book is not intended for those engaged in the practice of medicine. *Materia medica* is only briefly dealt with, although in many cases very abstruse details and complicated formulæ with regard to the chemical composition of substances, such, for instance, as hydrastine, are given. We think such details cannot be of use to the ordinary student of pharmacology, and to be of any value to the pharmacological or chemical worker should be accompanied by a reference to the literature from which they are derived; and here we will observe that although in his preface the author mentions a list of standard works dealing with pharmacology and *materia medica* to which he is indebted, all reference, so far as we can find, to books dealing with the question of the chemical composition and reactions of, for instance, the alkaloids and their derivatives is omitted.

The first thirty-eight pages of the book are devoted to general considerations, amongst which perhaps the most attractive is a discussion of the relation between physiological action and chemical constitution. This interesting subject is treated at some length, and most of the important facts bearing upon it are carefully considered. Under the heading of the standardisation of drugs, the author discusses the question of physiological standardisation. He rightly directs attention to the extreme difficulty of standardising certain preparations according to

their chemical content, and we entirely agree that, in the case of certain drugs, standardisation of a physiological type should be adopted; that is, different preparations should be compared with regard to their action upon a constant tissue unit. Such a method has been successfully adopted, under even more complicated conditions, in the comparison of the relative toxicity of certain sera. We must confess, however, that we are in this connection somewhat surprised to read that the cardiac glucosides can be standardised by perfusing the isolated rabbit's heart with Ringer's solution and subsequently adding the drug. The author must either be under some misconception with regard to the composition of Ringer's solution or be in possession of important facts which, so far as we are aware, he has not published.

From chapter iii. on, the book is devoted to descriptions of the characters, preparations, and physiological actions of the official, and some important unofficial, remedies and drugs. The action of each drug is most exhaustively considered, and in most cases illustrated by one or more curves, the result in the vast majority of cases of the author's own experimentation. The amount of space devoted to these curves is certainly a feature of the work, and renders to it, at least from one point of view, a unique value; as, however, usually no discussion of the conditions of the experiment accompanies the curves, the reader has too often to take upon trust the conclusions based upon them.

The mass of the pharmacology of the more purely inorganic substances is prefaced by a short but complete discussion of salt action and some of the chief bearings of modern physical chemistry upon pharmacological action.

The final chapter of the book is devoted to ferments, vegetable toxins, internal secretions, serum-therapy, and antagonism. The work concludes with an exhaustive index.

Dr. Dixon's "Manual" is certainly an important addition to standard pharmacological literature, and if in our opinion its educational value, taken as a whole, is less than that of certain of its contemporaries, this is to some extent due to the curious position its subject-matter holds in the complicated medical education of to-day. We have no hesitation in saying that it should be possessed by every pharmacologist and pharmacological laboratory, if only as containing a number of original experimental results worthy of control and further investigation.

A PIONEER IN BIOLOGY.

Jan Ingen-Housz. Sein Leben und sein Wirken als Naturforscher und Arzt. By Prof. Julius Wiesner. Unter Mitwirkung von Prof. Dr. Th. Escherich, Prof. E. Mach, Prof. R. von Topy, und Prof. Wegscheider. Pp. x+252. (Vienna: C. Kowegen, 1905.)

DR. WIESNER relates that on his becoming professor of plant physiology in the University of Vienna, more than thirty years ago, he resolved to become familiar with the work of the founders of that science. Soon he became peculiarly interested in